

Importance of Ethics in Computer Software Programming

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Although it is easy to see the positive impacts that computer technology gives us in our daily lives, it seems as though the nightly news shows are saturated with the wrongdoings of “big tech” and billion dollar companies invading our privacy by collecting our personal data. Other stories detail how computer programmers from enemy states are trying to shut off our fuel pipelines and interrupt our electrical power grids. Many people now use terms they have never used in the past such as artificial intelligence, algorithms designed to target particular citizen groups, and data mining; they all sound so nefarious.

For computer technology organizations, rapidly evolving technology presents new ethical dilemmas. In the article “Ethical Problems in Computing” published in *Comptia*, one of the IT industry's well-known trade magazines, Lou Berzai listed four ethical issues in the Computer Science industry. They are “(1) computer crime; (2) responsibility for computer failure; (3) protection of computer property, records, and software; and (4) privacy of the company, workers, and customers” (Berzai).

For me, I believe the biggest ethical dilemma I will personally face at work as a computer programmer is dealing with computer failure, more specifically, software failure. Software failures can cause harm to users in many different ways ranging from personal information breeches or even deadly incidents.

As an example, most everyone can recall the two recent Boeing 737 Max airliner crashes killing 346 people and subsequently grounding the entire fleet of B-737 Max aircraft for over

two years. Boeing is a renowned aircraft manufacture that has engineered and produced some of the safest and efficient aircraft ever. They employ the best of aircraft engineers and computer software developers. The B-737 was an exceptional airframe and a best seller for decades; therefore, it was the natural choice to become the “Next Generation” airliner using a longer fuselage and larger, more efficient engines. However, these larger engines made the lengthened B-737 aircraft less stable while in flight. To alleviate this stability problem, a computerized flight-control system called Maneuvering Characteristics Augmentation System (MCAS) to adjust the pitch angle while in flight assuming that pilots would be able to override MCAS in the event flight data was suspect. In a rush to compete against other aircraft manufacturers and to keep design expenses low, the B-737 Max quickly became Boeing’s bestseller.

During the investigations following the aircraft crashes, software failures quickly came to forefront as the reason for the tragedies. This is where the ethical questions come about. Some would point out that Boeing’s management leaders would be responsible as they made the financial decision to put the new aircraft in the marketplace as soon as possible to keep a competitive edge in the market.

In his article “Boeing's 737 MAX: A Failure of Management, Not Just Technology,” Michael Cusumano refers to the errors made by Boeing which begin with the company’s leaders as ethical errors. He specifically identifies these ethical errors as “putting profits before safety” and knowing that the software had unrealistic time limitations for overriding the MCAS. At the lowest level of responsibility, he also points blame at the team of developers. He says, “Someone should have spoken out when they knew something was wrong” (Cusumano).

Ethically, I agree with Mr. Cusumano with the responsibility lying with the individuals on the software development team. Someone had to know that it was not fully tested; primarily,

the override time capability was not based on all pilots including those from foreign countries where pilot training and certification is not as extensive as it is here in the United States. The proof of this is where the accident investigators transcript the crash pilot's final cockpit conversations based on them hurriedly reading a manual on how to override the MCAS.

This should not have been such an ethical dilemma for Boeing. As a computer programmer, I propose one should prepare to handle and overcome those dilemmas by using due diligence and check every line of code, every time. Additionally, the software needs testing for failure under many different conditions. Finally, I understand that I will sometime need to make the tough call and determine if the software is safe in its application. If not entirely safe for use, fix it or start over. I feel that too many times people choose to blame the organizational leadership when there is trouble. However, I feel as though software failures sometimes start at the very lowest levels. At the lowest level, one should be knowledgeable and understand what they are trying to accomplish. If you understand your code, then you know your tools and your program. This is a core ethic listed by the Association for Computing Machinery organization. "2.5 Give comprehensive and thorough evaluations of computer systems and their impacts, including analysis of possible risks. Computing professionals are in a position of trust, and therefore have a special responsibility to provide objective, credible evaluations and testimony to employers, employees, clients, users, and the public" (ACM).

The ACM provides additional general ethical guidance for ensuring that the software is safe for others. These ethical principles very much supported by scripture. Using ACM Professional Leadership Principle 3.1: "Ensure that the public good is the central concern during all professional computing work. People—including users, customers, colleagues, and others affected directly or indirectly—should always be the central concern in computing. The public

good should always be an explicit consideration when evaluating tasks associated with research, requirements analysis, design, implementation, testing, validation, deployment, maintenance, retirement, and disposal. Computing professionals should keep this focus no matter which methodologies or techniques they use in their practice” (ACM).

The Biblical scripture “So whoever knows the right thing to do and fails to do it, for him it is sin” (Holy Bible. English Standard Version, Romans. 1.17).

Similarly, using the Institute of Electrical and Electronics Engineers’ guidance to “uphold the highest standards of integrity, responsible behavior, and ethical conduct in professional activities. “To hold paramount the safety, health, and welfare of the public, to strive to comply with ethical design and sustainable development practices, to protect the privacy of others, and to disclose promptly factors that might endanger the public or the environment” (IEEE).

This is supported by the Biblical scripture “And as you wish that others would do to you, do so to them” (Luk. 6.31).

Computer software development will continue to grow and the changes to everyone’s life seems limitless. However, moving forward also means there will be some not so pleasant lessons learned. If computer programmers learn and operate within ethical standards based on scripture, computer technology will make positive and important impacts in our lives.

Works Cited

Berzai, Lou. "Ethical Problems in Computing." *Default*, 2 Nov. 2021,

<https://www.comptia.org/blog/ethical-problems-in-computing>.

Cusumano, Michael A. "Boeing's 737 MAX: A Failure of Management, Not Just Technology."

ACM, 1 Jan. 2021, <https://cacm.acm.org/magazines/2021/1/249448-boeings-737-max/fulltext>.

"IEEE Code of Ethics." *IEEE*, <https://www.ieee.org/about/corporate/governance/p7-8.html>.

"The Code Affirms an Obligation of Computing Professionals to Use Their Skills for the Benefit of Society." *Code of Ethics*, <https://www.acm.org/code-of-ethics>.

"100 Bible Verses about Business Ethics." *What Does the Bible Say About Business Ethics?*,

https://www.openbible.info/topics/business_ethics.